Nora Loose

✉ nora.loose@utexas.edu
noraloose.github.io

Research Interests

Ocean observing system design, Computational oceanography, North Atlantic - Arctic connectivity, Inverse and adjoint methods, Data assimilation, Uncertainty quantification

Education

08/2019 **University of Bergen**, Bergen, Norway.
Ph.D. in **Physical Oceanography**
- Thesis: *Adjoint Modeling and Observing System Design in the Subpolar North Atlantic*
- Advisors: Kerim H. Nisancioglu (University of Bergen), Patrick Heimbach (UT Austin)

02/2013 **University of Bonn**, Bonn, Germany.
Diploma (equiv. M.Sc. degree) in **Mathematics**, **with Honors**
- Specialization: Stochastic Analysis; Minor: Physics

Professional Appointments

10/2018 - present **Research Fellow**, *Oden Institute for Computational Engineering and Sciences*, University of Texas at Austin, USA.
- Mentor: Patrick Heimbach
- Develop quantitative and dynamics-based methods for ocean observing system design

03/2013 - 08/2014 **Research Fellow**, *Department for Mathematics*, ETH Zurich, Switzerland.
- Conducted research in the fields of Geometric Analysis and Partial Differential Equations
- Taught math courses for graduate & undergraduate students

Teaching and Outreach

2013 - 2014 **Teaching Assistant**, *Department for Mathematics*, ETH Zurich, Switzerland.
- Taught 3 different math courses for graduate & undergraduate students
- *Teaching evaluations*: 4.8 (2013), 4.9 (2014) on a scale from 1 (very bad) to 5 (excellent)

07/2013 **Teaching Assistant**, *PCMI Graduate Summer School*, Park City, USA.
- Taught advanced math course for Ph.D. students and postdocs at PCMI summer school organized by the Institute for Advanced Study, Princeton

2008 - 2013 **Teaching Assistant**, *Department for Mathematics*, University of Bonn, Germany.
- Taught 3 different math courses for undergraduate students

2010 **Teaching Assistant**, *Department for Mathematics*, University of Toronto, Canada.
- Taught math course for undergraduate students

2009 - 2011 **Organizer of outreach events**, *Hausdorff Center for Mathematics*, University of Bonn, Germany.
- Organized and led outreach events for students from elementary/secondary school to communicate the message: "Math is fun!"
- Ran bi-weekly "math club" to foster students' talent for mathematics
- Organized event for teachers to establish closer link between mathematics taught at universities & high schools

Professional Service

Organization of Conferences

04/2017 Co-Convener for the session "Quaternary climate archives and proxy uncertainty", EGU General Assembly 2017.

09/2015 Co-Organizer of PhD conference "Connecting the ocean, atmosphere and ice sheets", 20 participants, Denmark.

Awards and Scholarships

04/2019 **Rising Stars in Computational & Data Sciences**, *Oden Institute for Computational Engineering and Sciences*, University of Texas at Austin, USA.
- Selected to attend the competitive and international career event "Rising Stars in Computational & Data Sciences" for women (acceptance rate: 21%)

03/2018 **Best Presentation Award**, *Research School on Changing Climates in the Coupled Earth System*, Sommarøy, Norway.

2016 **Mini Research Grant**, *Norwegian Research School in Climate Dynamics*, NOK 20,000, for research stay at MIT.

2013 - 2016 **Scholarships for various summer schools**.
- IARC Summer School 2016, *IARC, University of Fairbanks*: $2,500 and accommodation
- ACDC Summer School 2015, *Norwegian Research School in Climate Dynamics*: Travel, accommodation, meals
- New Directions Short Course IMA 2015, *IMA, University of Minnesota*: Travel, accommodation, meals
- PCMI Summer School 2013, *Institute for Advanced Study (IAS), Princeton*: Travel, accommodation, meals

2009/10 **Scholarship for Study Abroad Program at the University of Toronto**, *University of Bonn*, Travel and tuition fees.

2008 - 2012 **Award German National Academic Foundation**, *Studienstiftung des deutschen Volkes*, for outstanding academic achievements (given to 0.5% of German university students).

2006 **Ferry Porsche Award**, *Porsche AG*, for excellent performance in mathematics and physics.

2006 **Award German Physical Society**, *German Physical Society*, for excellent performance in physics.

2006 **Award Reinhold Beitlich Foundation**, *Reinhold Beitlich Foundation*, for exceptional results in the Abitur (equiv. high-school diploma).

Publications

2019 Y. Fujii, E. Rémy, H. Zuo, P. Oke, G. Halliwell, F. Gasparin, M. Benkiran, **N. Loose**, J. Cummings, J. Xie, Y. Xue, S. Masuda, G.C. Smith, M. Balmaseda, C. Germineaud, D.J. Lea, G. Larnicol, L. Bertino, A. Bonaduce, P. Brasseur, C. Donlon, P. Heimbach, Y. Kim, V. Kourafalou, P-Y. Le Traon, M. Martin, S. Paturi, B. Tranchant and N. Usui: Observing System Evaluation Based on Ocean Data Assimilation and Prediction Systems: On-Going Challenges and a Future Vision for Designing and Supporting Ocean Observational Networks, *Front. Mar. Sci. 6:417*. doi: 10.3389/fmars.2019.00417.

2019 **N. Loose**: Adjoint Modeling and Observing System Design in the Subpolar North Atlantic, *Ph.D. Dissertation*, University of Bergen.

in prep. **N. Loose**, P. Heimbach, H. Pillar and K.H. Nisancioglu. The Information Potential of Observations assessed via Uncertainty Quantification in Ocean State Estimation. Part 1: A Dynamical Interpretation.

in prep. **N. Loose**, P. Heimbach, H. Pillar and K.H. Nisancioglu. The Information Potential of Observations assessed via Uncertainty Quantification in Ocean State Estimation. Part 2: Data Redundancy and Noise Masking.

in prep. **N. Loose**, P. Heimbach, H. Pillar and K.H. Nisancioglu. The Dynamical Proxy Potential of the OSNAP Array.

in prep. **N. Loose** and P. Heimbach. Dynamics-based Ocean Observing System Design via Adjoints.

in prep. **N. Loose**, H. Pillar, M. Årthun, K.H. Nisancioglu and P. Heimbach. Remote Drivers of Nordic Seas Heat Anomalies and Climate Predictability.

Presentations

Invited Talks

06/2018 **University of Oxford**, *Oxford, UK*, N. Loose, P. Heimbach: Adjoints as a Tool for Observing System Design.

04/2018 **EGU General Assembly 2018 (solicited)**, *Vienna, Austria*, N. Loose, P. Heimbach, K.H. Nisancioglu: How informative are SST proxy data in paleoceanographic inverse modeling? - Insights from comprehensive uncertainty quantification.

03/2018 **University of Edinburgh**, *Edinburgh, UK*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification and Constraints on Subsurface Heat Content at Greenland's Margins.

03/2018 **Northumbria University**, *Newcastle, UK*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification and Constraints on Subsurface Heat Content at Greenland's Margins.

Conference Presentations

10/2018 **ECCO Meeting**, *Austin, USA*, N. Loose, P. Heimbach, K. Nisancioglu: Comprehensive Observing System Design within the ECCO Framework.

07/2018 **Workshop on Sensitivity Analysis and Data Assimilation in Meteorology and Oceanography**, *Aveiro, Portugal*, N. Loose, P. Heimbach, K. Nisancioglu: Uncertainty Quantification as a Tool for Observing System Design - An Oceanographic Perspective.

03/2018 **CHESS Meeting**, *Sommarøy, Norway*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification and Observational Constraints in Paleoceanographic Inverse Modeling.

Posters

06/2017 **Data Assimilation Workshop**, *Bergen, Norway*, N. Loose, P. Heimbach, K.H. Nisancioglu: How Informative are Paleoceanographic Observations for an Inverse Problem?.

05/2017 **PAGES Workshop**, *Louvain-la-Neuve, Belgium*, N. Loose, P. Heimbach, K.H. Nisancioglu: How Informative are Paleoceanographic Observations for an Inverse Problem?.

04/2017 **EGU General Assembly 2017**, *Vienna, Austria*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification for Non-Linear Inverse Problems with Sparse Data.

03/2017 **Workshop on Emerging Applications of Data Assimilation in the Geosciences**, *Leiden, Netherlands*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification for Adjoint-Based Data Assimilation with Sparse Data.

12/2016 **AGU Fall Meeting 2016**, *San Francisco, USA*, N. Loose, P. Heimbach, K.H. Nisancioglu: Can Paleo Ocean Proxy Data Constrain General Circulation Models Using an Inverse Method?.

Field Work

07/2017 - 08/2017 **East Greenland Ice-Core Project (EastGRIP)**, *Greenland*.
- Drilled shallow ice cores, conducted surface measurements and lab work in the science trench

08/2016 - 09/2016 **G.O. Sars**, *Greenland/Iceland*.
- Processed marine sediment cores on a paleoceanographic research cruise

Skills

Programming

- Python, MATLAB, MITgcm, Fortran, C++, Unix/Linux operating systems, shell scripting, NetCDF, LaTeX.

Languages

- **Fluent in:** German, English, Norwegian; **Basic knowledge in:** Spanish, Italian.